CLAIMS:

1. A brightness enhancement film comprising an array of tapered structures, each said tapered structure having a light input aperture and a larger light output aperture, wherein the inner surface of each said tapered structure is adapted to reflect off-axis light incident at said input aperture to said output aperture.

2. A brightness enhancement film according to claim 1 wherein said array of tapered structures comprises an array of hollow, reflective cavities extending between a light input surface and a light output surface.

3. A brightness enhancement film according to claim 1 wherein said array of tapered structures comprises an array of concentrators extending between an input aperture on an input surface and an output aperture on an output surface, each said concentrator having a generally parabolic shape, wherein said input surface is in contact with a light guiding plate; and each said concentrator has an index of refraction substantially equal to the index of refraction of said light guiding plate.

4. A brightness enhancement film according to claim 1 wherein, in a cross-section parallel to said output aperture, said tapered structure is substantially circular.

5. A brightness enhancement film according to claim 1 wherein, in a cross-section parallel to said output aperture, said tapered structure is substantially hexagonal.

6. A brightness enhancement film according to claim 1 wherein, in a cross-section parallel to said output aperture, said tapered structure is substantially rectangular.

7. A brightness enhancement film according to claim 1 wherein said off-axis light is provided by a light guiding plate.

8. A brightness enhancement film comprising an array of hollow, reflective cavities extending between a light input surface and a light output surface.

9. A brightness enhancement film according to claim 8 wherein at least one of said hollow, reflective cavities comprises a curved side-wall.

10. A brightness enhancement film according to claim 9 wherein, in a cross-section from said input surface to said output surface, said curved side wall is substantially parabolic.

11. A brightness enhancement film according to claim 8 wherein, in a cross-section parallel to said output surface, said hollow reflective cavities are substantially circular.

12. A brightness enhancement film according to claim 8 wherein the side-wall of at least one of said reflective cavities comprises a reflective coating.

13. A brightness enhancement film according to claim 8 wherein at least two of said hollow, reflective cavities differ dimensionally from each other.

14. A brightness enhancement film according to claim 8 wherein said input surface comprises a transparent substrate.

15. A brightness enhancement film according to claim 8 wherein said output surface comprises a transparent substrate.

16. A brightness enhancement film according to claim 8 wherein the film comprises a reflective substrate.

17. A brightness enhancement film according to claim 8 wherein each said hollow, reflective cavity has an input aperture and an output aperture, said output aperture being larger in area than said input aperture.

18. A brightness enhancement film comprising an array of hollow, reflective cavities extending between a light input surface and a light output surface, wherein each said hollow reflective cavity has an input aperture for accepting incident off-axis light and a larger output aperture.

19. A brightness enhancement film according to claim 18 wherein at least one of said hollow, reflective cavities is substantially parabolic in a cross-section from said input surface to said output surface.

20. An illumination system comprising:

(a) a light guiding plate for providing a generally Lambertian light source;

(b) a brightness enhancement film comprising an array of hollow, reflective cavities extending between a light input surface and a light output surface; said input surface of said brightness enhancement film disposed proximate to said light guiding plate to receive light thereform.

21. An illumination system according to claim 20 wherein at least one said reflective cavity of said brightness enhancement film comprises a curved side-wall.

22. An illumination system according to claim 21 wherein, in a cross-section extending from said input surface to said output surface, said curved side wall is substantially parabolic.

23. An illumination system according to claim 20 wherein, in a cross-section parallel to said output surface of said brightness enhancement film, at least one said reflective cavity is substantially circular.

24. An illumination system according to claim 20 wherein, in a cross-section parallel to said output surface of said brightness enhancement film, at least one said reflective cavity is substantially rectangular.

25. An illumination system according to claim 20 wherein, in a cross-section parallel to said output surface of said brightness enhancement film, at least one said reflective cavity is substantially hexagonal.

26. An illumination system according to claim 20 wherein the side-wall of at least one of said reflective cavities of said brightness enhancement film comprises a reflective coating.

27. An illumination system according to claim 20 wherein at least two of said hollow, reflective cavities of said brightness enhancement film differ dimensionally from each other.

28. An illumination system according to claim 20 wherein said input surface of said brightness enhancement film comprises a transparent substrate.

29. An illumination system according to claim 20 wherein said output surface of said brightness enhancement film comprises a transparent substrate.

30. An illumination system according to claim 20 wherein the input surface of said brightness enhancement film is reflective.

31. A display apparatus comprising:

(a) a light guiding plate for providing a generally Lambertian light source;

(b) a brightness enhancement film comprising an array of hollow, reflective cavities extending between a light input surface and alight output surface, said input surface of said brightness enhancement film disposed proximate to said light guiding plate, said brightness enhancement film providing, from said output surface, a backlight illumination; and,

(c) an LCD display panel for modulating said backlight illumination to form an image.

32. A brightness enhancement film comprising an array of concentrators extending between a light input aperture along an input surface and a light output aperture along an output surface, each said concentrator having a generally parabolic shape, wherein, for each said concentrator:

(a) the area of its input aperture is less than the area of its output aperture;

(b) the input surface is in contact with a light guiding plate; and

(c) the index of refraction substantially equal to the index of refraction of said light guiding plate.

33. A brightness enhancement film according to claim 32 wherein a lens is formed at said output aperture for at least one said concentrator.

34. A brightness enhancement film according to claim 32 wherein total internal reflection within each said concentrator directs a portion of off-axis light from said input aperture to said output aperture.

35. An illumination system comprising:

(a) a light guiding plate for providing light;

(b) a brightness enhancement film comprising an array of concentrators extending between a light input aperture along an input surface and a light output

aperture along an output surface, each said concentrator having a generally parabolic shape, wherein, for each said concentrator:

(1) the input aperture is less than the area of its output aperture;

(2) said input surface is in contact with said light guiding plate; and

(3) the index of refraction is substantially equal to the index of refraction of said light guiding plate.

36. A display apparatus comprising:

(a) a light guiding plate for providing light;

(b) a brightness enhancement film comprising an array of concentrators extending between a light input aperture along an input surface and a light output aperture along an output surface, wherein each said concentrator:

(1) has a generally parabolic shape, wherein, for each said concentrator, the area of its input aperture is less than the area of its output aperture;

(2) has an input surface is in contact with said light guiding plate; and,

(3) has an index of refraction substantially equal to the index of refraction of said light guiding plate; and,

(c) an LCD display panel for modulating said backlight illumination to form an image.

37. A light guiding plate for providing backlighting, comprising an output surface having an array of tapered concentrators, each concentrator having a generally parabolic shape and a light input aperture and a light output aperture, wherein the input aperture of each said concentrator is smaller than the output aperture.

38. An illumination apparatus comprising:

(a) a light source;

(b) a brightness enhancement film comprising an array of hollow, reflective cavities extending between a light input surface and a light output surface; said input surface of said brightness enhancement film disposed proximate to said light source.

39. An illumination apparatus comprising:

(a) a light source surface for providing light;

(b) a brightness enhancement film comprising an array of concentrators extending between a light input aperture along an input surface and a light output aperture along an output surface, each said concentrator having a generally parabolic shape, wherein, for each said concentrator:

(1) the area of its input aperture is less than the area of its output aperture;

(2) said input surface is in contact with said light source surface; and,

(3) the index of refraction is substantially equal to the index of refraction of said light source surface.

40. A method for enhancing luminance for a backlit display, comprising:

(a) providing an array of hollow, reflective cavities, each cavity having a light input aperture and a light output aperture; and,

(b) directing light to said array of cavities.

41. A method for enhancing luminance according to claim 40 wherein the step of providing an array of hollow, reflective cavities comprises the step of forming said cavities into a film substrate.

42. A method for enhancing luminance according to claim 41, further comprising the step of coating said cavities.

43. A method for enhancing luminance according to claim 40 wherein at least one said hollow, reflective cavity has a generally parabolic cross-section, taken from said light input aperture to said light output aperture.

44. A method for enhancing luminance according to claim 40 wherein the step of directing light to said input aperture comprises the step of generating light from a Lambertian source.

45. A method for enhancing luminance for a backlit display, comprising:

(a) providing a light guiding surface having a first index of refraction *n1*;

(b) forming an array of tapered concentrators, each concentrator having a generally parabolic shape, wherein:

(1) the input aperture of each said concentrator is smaller than the output aperture;

(2) each said concentrator has a second index of refraction *n;*, and

(3) *n2* is substantially equal to *n1*;

(c) disposing the input aperture of a plurality of said concentrators against said light guiding surface.

46. A method for enhancing luminance for a backlit display according to claim 45 wherein the step of disposing the input aperture of a plurality of said concentrators against said light guiding surface comprises the step of applying an adhesive to an input surface of said array of tapered concentrators.